**K-5 Math Lesson Plan**

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| **Teacher:**  **Aldous/Wells** | | | **Grade: 5** | | | **Date(s)**: September 2012 |
| **Unit Title:**  Unit 2 - Operations with Whole Numbers and Decimals | | | | **Corresponding Unit Task:**  Teach prior to Task 1 | | |
| **Essential Question(s):**  **How do I use multiplication strategies to solve problems with large quantities?** | | | | | | |
| **Materials/Resources** | | | | **Essential Vocabulary** | | |
| **Teacher: graph/grid paper (2-sided or multiple sheets per student), colored pencils, base-10 blocks, index cards, poster board** | | **Student:**  **Math journal/notebook, colored pencils** | | | **multiplication/multiply, division/divide, products, quotients, dividends, rectangular arrays, area models, equations, factor** | |
| **Learning Experience** | | | | | | |
| **8 Mathematical Practices:**  √ 1. Make sense of problems and persevere in solving them.  √ 2. Reason abstractly and quantitatively.  3. Construct viable arguments and critique the reasoning of others.  √ 4. Model with mathematics.  √ 5. Use appropriate tools strategically.  √ 6. Attend to precision.  7. Look for and make use of structure.  √ 8. Look for and express regularity in repeated reasoning. | **Common Core State Standards:**  **5.NBT.5**  ***Fluently multiply multi-digit whole numbers using the standard algorithm.***  **(Correlates to NCSCOS Math Objective 1.03)** | | | | | |
| **I Can Statement(s):**   * **I can use the standard algorithm to multiply** * **I can fluently multiply multi-digit numbers using the standard algorithm.** | | | | | |
| **Activating Strategy/Hook:** (How will students become cognitively engaged and focused?)  Single digit multiplication fact review. Give the students a quiz, timed or not, containing multiplication facts from 1-10 to review multiplication. Check with class. | | | | | |
| **Teacher Directed:**  Review creating and using rectangular arrays to solve multiplication problems.  Remind students of the meaning of the area of a figure (a measure of size expressed in square units), and how to find the area of a rectangle (multiply the length times the width).  Example:  Use tiles or a diagram to make a rectangle that is 3 x 7. Break the rectangle into two parts to demonstrate that 3 x 7 = 3(5+2) and 3 x 7= (1+2)7. Write in partial products.  7   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |   3    **1. What does the rectangle show? 3 rows of 7 = 21, 7 columns of 3 = 21, 3 x 7=21**  **2. Describe how the items are arranged in an array.**  **3. What is the total number of items in your array? Show how you can use addition to find out. Show how you can use multiplication to find out.**  **4. Write a multiplication sentence to go with your array.**  The following website allows you to create many different arrays and will work well with a SmartBoard or projector. [**www.haelmedia.com/OnlineActivities\_txh/mc\_txh3\_002.html**](http://www.haelmedia.com/OnlineActivities_txh/mc_txh3_002.html)  **Area Models**  Tell the students they are going to learn how to extend the arrays to multiply larger numbers by using Area Models.  The area model for multiplication is a pictorial way of representing multiplication. In the area model, the length and width of a rectangle represent factors, and the area of the rectangle represents their product.  Give the following example:  15 x 5  In a standard array it would be 15   |  | | --- | |  |   5  Remind students that 15 = 10 + 5  The students will use this to create an easier multiplication problem  Rewrite the array as: 5 10   |  |  | | --- | --- | |  |  |   5  This is an area model  Now solve each “piece”: : 5 10   |  |  | | --- | --- | | 5 x 5 = 25 | 5 x 10 = 50 |   5  Now add each product 25 + 50 = 75  It can also be used to solve large multiplication problems with two-digit factors  Example  24 x 16  Think of 24 as (20 + 4)  Think of 16 as (10 + 6)  **24**  20 4  10   |  |  | | --- | --- | | 10 x 20 = 200 | 10 x 4 = 40 | | 6 x 20 = 120 | 6 x 4 = 24 |     **16**    6    Now add the products from each box  200 + 40 + 120 + 24 = 384 | | | | | |
| **Guided Practice:**  Each student is given graph paper and 4 different colored pencils  Post the following problem on the board  *A school has 15 classrooms. Each classroom collects 12 cans of food. How many cans of food were collected altogether?*  Have the students create a 15 x 12 rectangle on their graph paper.  Divide the rectangle as follows:  10 5   |  |  | | --- | --- | |  |  | |  |  |   10      2  Color each section a different color and find the product in each section  10 5   |  |  | | --- | --- | | 10 x 10 = 100 | 10 x 5 = 50 | | 2 x 10 = 20 | 2 x 5 = 10 |   10  2  100 + 50 + 20 + 10  150 + 30 = 180  15 x 12 = 180  Have students share their results with a table partner.  Display second problem:  *One classroom delivered 13 boxes of food to the shelter. Each box contained 11 bags of food. How many bags of food did the classroom deliver?*  Have the students solve by repeating the above process. Each should check their results with a table partner. Check/review as a class when all have finished.  Problem #3  Students will not be able to use their graph paper, due to the size of the numbers. They will have to draw the area model.  *The fifth grade collected 24 boxes of food, each containing 32 items. How many total items did the fifth grade collect?*  Have students draw a rectangle, divide it into 4 sections.  Remind them to think of 24 as 20 +4 and 32 as 30 + 2  20 4   |  |  | | --- | --- | | 20 x 30 = 600 | 4 x 30 = 120 | | 20 x 2 = 40 | 4 x 8 = 32 |   30  2  Have the students solve the product in each section and add.  600 + 120 + 40 + 32  720 + 72 = 792  After completing, have the students share their results with their table partners | | | | | |
| **Independent Practice:**  To be completed in students math journal/notebook  Post the following on the board or put on a word document and pass out  Instruct the students to use area models to solve. While they are working, check that they are correctly drawing and using the area models.  ***1. A school collected 42 bags of dry pasta for the food bank. Each bag weighs 16 pounds. What is the total weight of the pasta the school collected? 672 lbs, check student models***  ***2. The 4th grade collect 19 bins of food, the 3rd grade collected 21 bins of food. If the bins each hold 35 cans of food, how many cans did each grade collect? 4th grade – 665 3rd grade – 735 Check student models***  ***3. The pantry at our school contains 43 bushels of food. If 1 bushel is about 35 liters, how many liters of food are in our school pantry? 1505 L***  ***4. Guilford county collected 19 boxes of pretzel bags. Each box contains 39 bags. How many total bags did Guilford county collect? 741 bags***  ***5. The third grade collected 25 boxes of onions. Each of the boxes contained 45 onions. How many total onions did the third grade collect? 1125 onions*** | | | | | |
| **Closing/Summarizing Strategy:**  **Ticket out of the door**  Draw an area model to solve the following  41 x 38 | | | | | |
| **Differentiation Strategies** | | | | | | |
| **Extension** | | | **Intervention** | | | **Language Development** |
| A bushel of apples weighs 48lbs and a bushel of onions weighs 57lbs. Our school collects 26 bushels of apples and 22 bushels of onions. Use the area model to determine which product has the most total weight. What was the difference between the two total weights? | | | [www.learner.org](http://www.learner.org) This website allows students to manipulate base-10 blocks to create area models to solve problems. There are up to 5 problems.  Base-10 blocks  Use base-10 blocks to illustrate a problem.  Example: 3 x 14  Have the students create *3 rows of 14.* The students can determine the value by counting but you should challenge them to find the value without counting. They will see that there are 3 groups of 10 (bars) and 3 groups of 4 (individual blocks, total of 12). They should understand the 3 groups of 10 as 30 and the 3 groups of 4 as 12. They can then add the 12 and 30 to get 42.  Repeat with other examples as needed. | | | Demonstrate how to count vertical and horizontal rows and the area inside the array with “think alouds”. Show the transfer between the array and a written story problem. “Mary’s classroom has 8 rows with 16 desks in each row. How many desks are in the classroom” Write the problem 8 x (of) 16 while thinking aloud: “I have 8 groups of 16 desks so I have \_\_\_\_ desks in all.” Show the array 8 by 16 and how it shows 8 rows of 16 groups. Count the number of dots in the array.  Continue to demonstrate different problems using scaffolding and “think alouds”. Check student understanding by asking questions such as “I’m using an area model to multiply. The area is the space inside my numbered lines. Where is the area?”  “I’m showing you how to combine groups of numbers that is a math operation called multiplying. What math operation are we doing?”  Use non-examples to check student understanding. |
| **Assessment(s):**   * Check students’ “Ticket out the Door” * Put the students into small groups. Each group will create a “teaching poster” of area models. Each group will receive an index card with a sample problem. They are to create a poster, teaching how to create the area model for their sample problem. Have each group share with the class and display. | | | | | | |
| **Teacher Reflection:** (Next steps?)   * What went well? * Specific notes about students’ thinking * Student understandings/misconceptions * What do I need to reteach/review tomorrow or in the future? * New ideas or changes for next time | | | | | | |